Screenings vs Eye Examinations
What’s the Difference?

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The Problem

• Too many children enter school with a vision problem
• Only a small percentage have an eye examination before beginning school
• A vision problem gets in the way of learning

The Problem

• Adult cannot function on the job
• Cannot see well enough to drive
• Avoids certain activities due to visual problem
Prevalence of Vision Problems

• Children

• Orinda
  – 18% of 6 year olds
  – 32% of 14 year olds

• Vision in Preschoolers
  – Any condition 30.3%

Prevalence of Vision Problems

• Adults

• Myopia
  – 1972 25%
  – 2004 ?

Prevalence of Vision Problems

• Adults

• Myopia
  – 1972 25%
  – 2004 42%

• Presbyopia
  – 100% over age 50
Two Approaches

• Vision Screenings
  – Employ test battery
  – Balance sensitivity vs. specificity
  – Designed to be used by ancillary personnel
  – Those who do not pass are referred for further evaluation

• Comprehensive Eye Examinations
  – Individualized
  – Problem oriented
  – Trained professionals
  – Definitive endpoint and diagnosis

<table>
<thead>
<tr>
<th>Condition Positive</th>
<th>Condition Negative</th>
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<tbody>
<tr>
<td>Test Positive</td>
<td>A</td>
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<tr>
<td>Test Negative</td>
<td>C</td>
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<tr>
<td>Condition</td>
<td>Test Outcome</td>
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<td>Positive</td>
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<table>
<thead>
<tr>
<th>Condition</th>
<th>Test Outcome</th>
<th>True Positive</th>
<th>False Positive (Type I error)</th>
<th>False Negative (Type II error)</th>
<th>True Negative</th>
</tr>
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<tbody>
<tr>
<td>Positive</td>
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Screening considerations

- Sensitivity - how many identified as positive out of all those with the condition?
- Specificity - how many identified as negative out of all those without the condition?

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Vision Screening

- In keeping specificity high, sensitivity suffers
  - Some may identify only 25% of vision problems
    - Prevent Blindness America
  - Others may identify 67%
    - Findings from the Vision in Preschoolers Study, Vision in Preschoolers Study Group
## Two Approaches

### Vision Screenings
- Employ test battery
- Balance sensitivity vs. specificity
- Designed to be used by ancillary personnel
- Those who do not pass are referred for further evaluation

### Comprehensive Eye Examinations
- Individualized
- Problem oriented
- Trained professionals
- Definitive endpoint and diagnosis

## Vision Screenings

- Difficulty in balancing all the considerations
  - Time
  - Simplicity
  - Cut-off point
  - Cost

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![Table Image](image-url)
Vision Screenings

- Difficulty in balancing all the considerations
- Reduce the process to a few tests
- Schools
  - Distance acuity
  - Near acuity
  - Stereoaucuity
- Driver’s license
  - Distance acuity, horizontal visual field

Comprehensive Eye Exams

- Considerations
  - Time
  - Cost
  - Tailored
  - Finality

Screening considerations

- Sensitivity - how many identified as positive out of all those with the condition?
- Specificity - how many identified as negative out of all those without the condition?
- Overall prevalence
Prevalence of Vision Problems

- Orinda
  - 18% of 6 year olds
  - 32% of 14 year olds

- Vision in Preschoolers
  - Any condition 30.3%
  - Most severe 12.2%

Preschool Screenings

- Vision screenings by primary care physicians for preschoolers ~15-30%

Preschool Screenings

- Only 36% of children aged 5 years and under had received a vision screening
  - National Eye Institute, National Institutes of Health and Human Services.

Vision Screening

- Follow through on referrals is also a problem
  - 40-67% of students do not get the follow up examination


Barriers to Follow-up

- 40% no insurance coverage
- 30% did not know where to go
- 10% would wait until the screening next year
- 10% did not think there was a problem

States Requiring Vision Examination

- Kentucky HB 706-2000
- North Carolina 2005
- Missouri SB 16-2007
- Illinois 2007

States Requiring Vision Examination 2011

- Kentucky
- Missouri
- Illinois

States Requiring Vision Examination 2013

- Kentucky
- Illinois
Missouri

• What percentage of children got the required eye examination?
  – A. 12%
  – B. 23%
  – C. 37%
  – D. 51%
  – E. 88%

• What percent of parents signed a letter asking to “opt out” of the requirement?
  – A. 12%
  – B. 23%
  – C. 37%
  – D. 51%
  – E. 88%

Missouri

• Do the math, that means 40% do not get the eye examination or “opt out”. They just ignore the requirement.
Prevalence of Vision Problems

• What percentage of the population entering school have a vision problem?
  – A. 3%
  – B. 8%
  – C. 10%
  – D. 20%
  – E. 30%

Prevalence of Vision Problems

• What percentage of those children getting comprehensive eye examinations required treatment or follow up?
  – A. 3%
  – B. 8%
  – C. 10%
  – D. 20%
  – E. 30%

Prevalence of Vision Problems

• What percentage of children were referred for an eye examination after failing a school screening?
  – A. 3%
  – B. 8%
  – C. 10%
  – D. 20%
  – E. 40%
Prevalence of Vision Problems

• What percentage of those referred did not get the comprehensive eye examination?
  – A. 3%
  – B. 5%
  – C. 10%
  – D. 20%
  – E. 40%

Cost of Education

• State cost per child per year $10,000

Donohue-Photoscreening

• 4.7% are referred
• 74% predictive value
Donohue-Photoscreening

- 4.7% are referred
- 74% predictive value
- So...3.5% of population identified with a vision problem

Based on Prevalence

- If 20% of this population has a vision problem and
- If the screening is identifying 3.5%

Based on Prevalence

- It means they are missing 4-5 times as many as they detect!
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**Classroom**

- Blue dots represent Condition Positive.
- Red dots represent Test Positive.
- Green dots represent Test Negative.
- Orange dots represent Condition Negative.
Classroom

The Future

• Screenings only identify some of the people with vision problems.
• Where do we go from here?
• Possibilities
The Future